

THE TAXONOMIC STATUS OF PROTOCYRTANDRA (GESNERIACEAE)

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THE GENUS *Procyrtandra* is based upon *Cyrtandra todaiensis* Kanehira, of which the type (*Kanehira* 1854) was collected on the island of Korrör, Palau, Caroline Islands, and described in 1933. In 1934, Hosokawa gave generic rank to this taxon on the basis of "4 perfect stamens sitting freely with each other." The purpose of the present paper is to present an amplified description and an illustration of *C. todaiensis*, to relate its geographical location to the distribution of the genus, and to clarify its taxonomic status.

It must be emphasized that *Cyrtandra* is a little studied assemblage of some 600 species in which there is a remarkable propensity for evolutionary change, this being most noticeable in the morphology of the flower. The center of diversity for the genus is in the region of New Guinea, the Celebes, and Borneo, where there are about 300 species. In the territory from the Solomon Islands and Queensland, extending west and north to the Nicobar Islands and Botel Tobago Island (map, FIGURE 1) there are perhaps 400 species. The genus is distributed from this area north and east to islands of the Pacific on which there are an estimated 200 species, over one-half of which are endemic to the Hawaiian Islands. The extensive distribution of this genus and of a multitude of other insular Pacific genera defies explanation on other than speculative terms. Perhaps the most conservative speculation that can be advanced for *Cyrtandra* is that dispersal was accomplished by frugivorous birds adapted to the conspicuous, fleshy fruits and very small seeds (Guppy, 1906; Carlquist, 1967; Gillett, 1967).

Cyrtandra is adapted to almost continually wet, well-shaded habitats in forested ravines and gullies. Dispersal, therefore, has been limited almost exclusively to those "high" islands on which there is an abundance of rain forest vegetation. There are no cyrtandras on Yap, a "high" island on which the rain forest, presumably, was long ago removed by cultivation. No *Cyrtandra* has been collected on Niihau in the Hawaiian Islands. Although Niihau rises to approximately 400 meters, it is situated in the rain shadow of the island of Kauai and therefore has no rain forest vegetation. No *Cyrtandra* species occur in the Tuamotu Archipelago, an assemblage of "low" islands; none are known in the Marshall Islands, also "low" islands.

The genus *Cyrtandra* has a remarkable diversity in habit, occurring as herbs, shrubs, trees, or vines. The leaves are always simple, but may be

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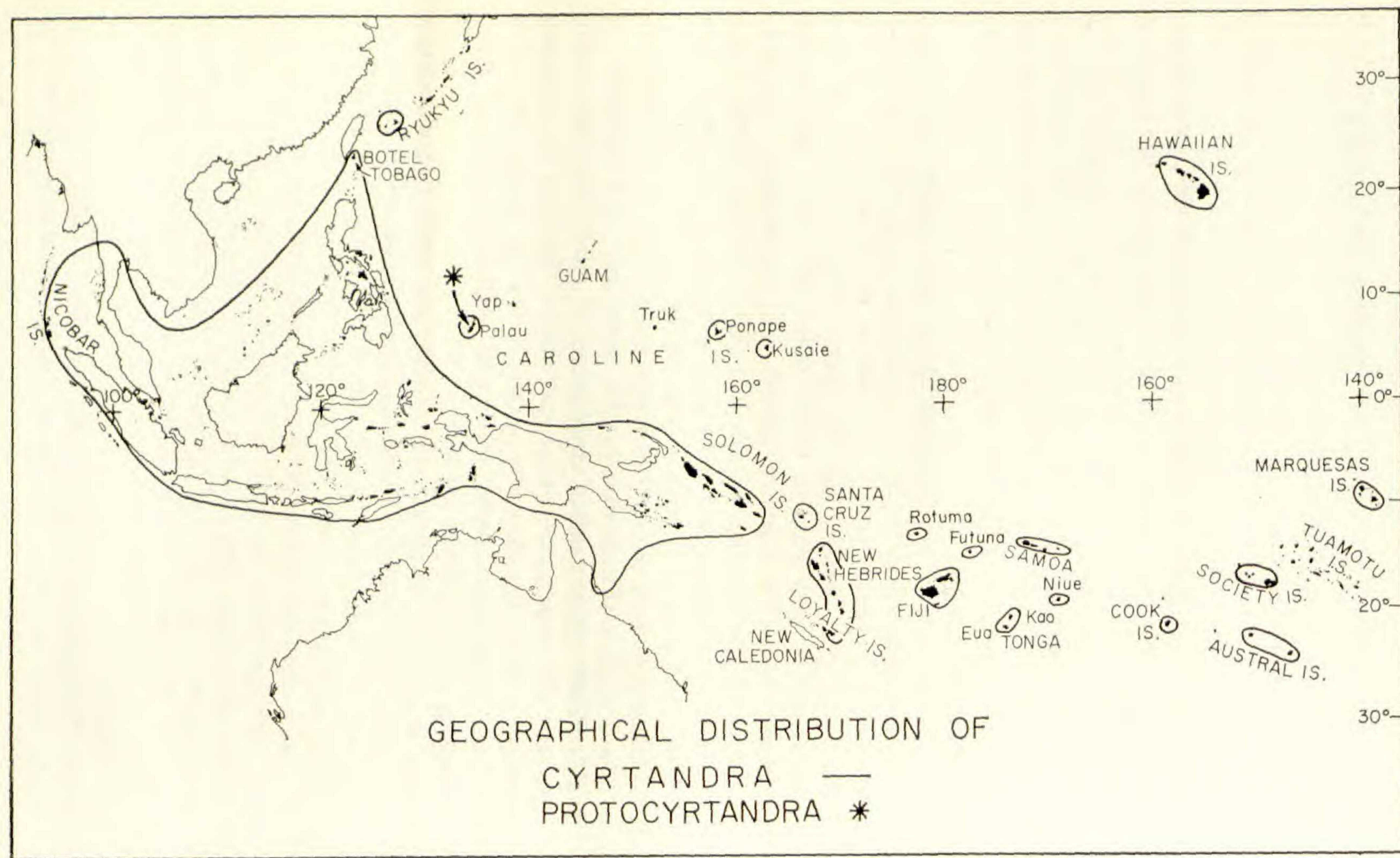


FIGURE 1. Map showing distribution of *Cyrtandra* and *Protocyrtandra*.

alternate, opposite, or whorled, with a diverse expression of marginal detail and indument. The flowers are extremely variable in form, most often with two stamens having coherent anthers and three staminodes, sometimes with the stamens not united, and occasionally (St. John, 1966) with sterile anthers borne on the staminodes. Therefore, the presence of four or five fertile stamens in the flowers of a given species does not seem particularly notable. While zygomorphy is the rule for the genus as we now know it, the corollas of some Hawaiian species come remarkably close to actinomorphy. It seems reasonable to predict that valvate, actinomorphic corollas, now known only in *Cyrtandra todaiensis*, will be found in other species.

It is appropriate to point out that several species of *Cyrtandra* are distinguished by possession of unisexual flowers. These species occur in New Guinea, the Solomon Islands, Fiji, and the Hawaiian Islands. The first to be discovered was accorded generic rank, as *Cyrtandropsis*, by Lauterbach (1910), and other species were added by Schlechter (1923). The genus was reduced by Burtt (1936) on the grounds that species with unisexual flowers thus brought together were very different in other characters. The propensity for the evolution of unisexual flowers is so widespread in Pacific genera (Carlquist, 1966) that their occurrence in *Cyrtandra* must be taken as an insignificant variation on a very common theme. If we were to give generic status to those populations of *Pittosporum*, *Wikstroemia*, *Santalum*, *Geniostoma*, *Alectryon*, *Pisonia*, *Styphelia*, *Myrsine*, and of other Pacific genera in which unisexual flowers have evolved, the proliferation of new genera would be ludicrous. It is my judgment that this same reasoning applies to evolutionary changes in the number of stamens in *Cyrtandra*.

Generic status for *Cyrtandra todaiensis* is rejected at this time because I believe there is a strong possibility that a definitive study of *Cyrtandra* will reveal intermediate expressions and character combinations that would make *Protocyrtandra* untenable. In this era of proliferation of new genera, it is held that a new genus must be demonstrated to be distinct *before*, not after, it is proposed. Such proof can be provided in this instance only by a review of all of the 600-odd species of *Cyrtandra*, after which an enduring decision can be reached as to whether this species should be accorded sectional, subgeneric, or generic rank.

It is a great pleasure to acknowledge the assistance of Mrs. Sheila A. Hardy, who collected in the Palau Islands during her recent tenure as a Peace Corps volunteer in the Caroline Islands. Mrs. Hardy was assisted by Mr. Demei O. Otobed, who unerringly guided her on several field trips. The field work of Mrs. Hardy and Mr. Otobed provided a mass collection, including spirit collections of flowers and fruits. The following description was prepared from the study of this extensive material. The illustration of *Cyrtandra todaiensis* was prepared by Mrs. Marion R. Sheehan. The manuscript was constructively reviewed by Mr. B. L. Burtt, Royal Botanic Garden, Edinburgh, to whom appreciation is extended.

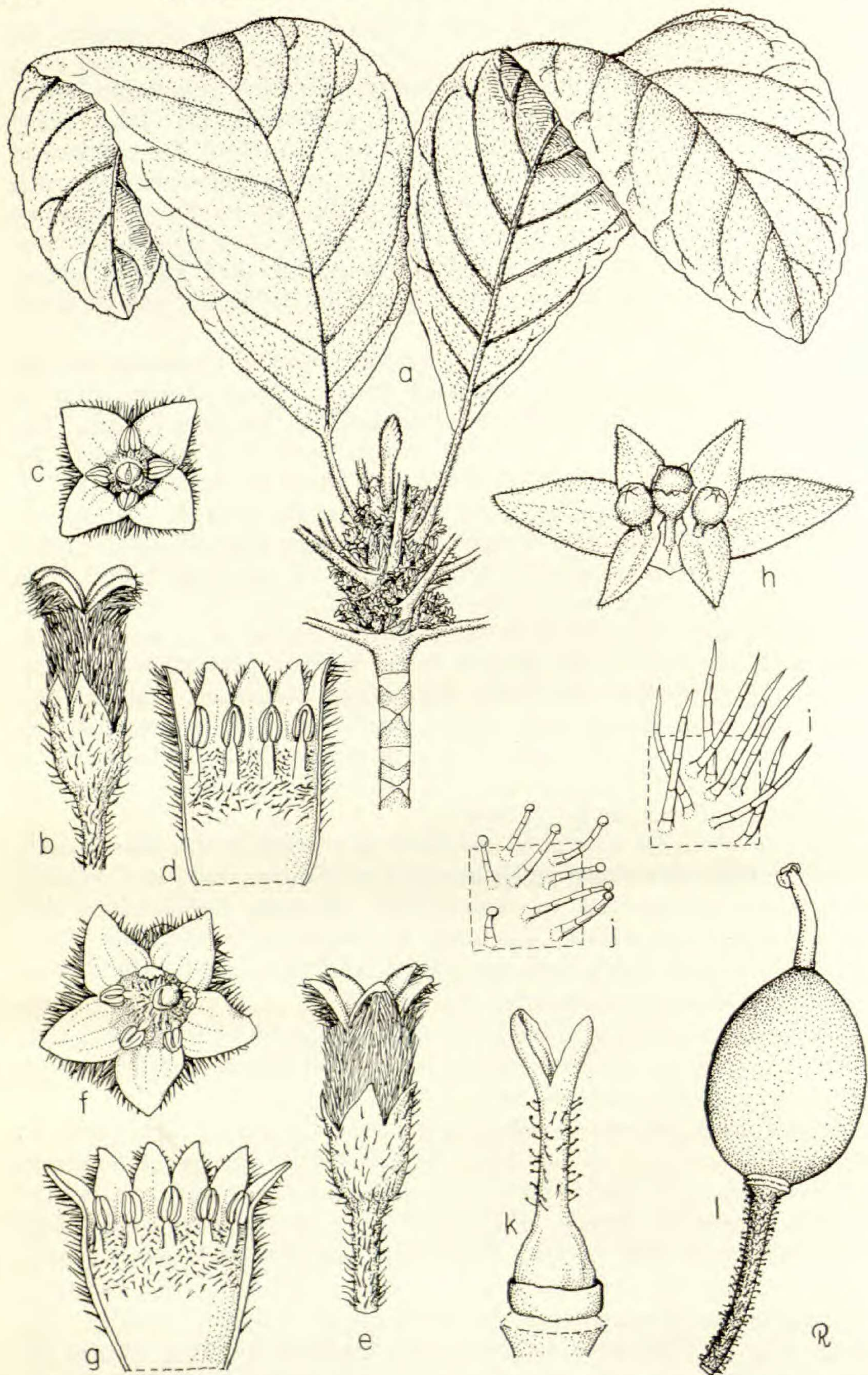


FIGURE 2. *Cyrtandra todaiensis*. All drawings from Hardy & Otobed s.n.
 a, flowering branch, $\times 1/4$; b, 4-stamen flower, $\times 2$; c, same in plane view,

Cyrtandra todaiensis Kanehira, Bot. Mag. Tokyo 47: 679. 1933.

FIGURE 2.

Protocyrtandra todaiensis (Kanehira) Hosokawa, Trans. Nat. Hist. Soc. Formosa 24(132): 202, 203. 1934.

Erect shrub 2–3 m. high with pubescence of light brown, septate, uniseriate, noncapitate hairs ca. 30μ in diameter and 1 mm. long; mature stems up to 2 cm. in diameter, round in cross section, fistulose; young foliage densely lanate with light brown hairs; leaves decussate, glabrate at maturity, the petioles glabrate, up to 14 cm. long, connate at bases, the blades lanceolate to oblanceolate to elliptic, up to 40 cm. long and 20 cm. broad, unequal and acute to cuneate at base, acute to rounded at apex, undulate to entire at margins, the venation obscure above, conspicuous beneath, the primary veins 10–14 per side, curved apically and distally parallel to the margin, the secondary veins concealed above, reticulate below; inflorescence a congested, sessile, bracteate cyme of 15 to 20 pedicellate flowers, the outer bracts villose, lanceolate to oblanceolate, 2 cm. long and 0.5 cm. broad, the inner bracts of similar shape but smaller, deciduous; flowers perfect, borne on pedicels 0.5 to 1.5 cm. long, the calyx foliaceous, deciduous, up to 12 mm. long, cleft into 3, 4 or 5 unequal or equal, valvate lobes ca. 7 mm. long, densely pubescent on outer surface with noncapitate hairs ca. $60\text{--}120\mu$ in diameter and up to 4 mm. long, glabrous on inner surface; corolla actinomorphic, up to 17 mm. long, cleft into 4, 5 or 6 equal valvate lobes ca. 5 mm. long, pilose on the outer surface with noncapitate hairs ca. 90μ in diameter and 2 mm. long, within pubescent at middle of tube with multicellular, uniseriate, non-capitate hairs (below) and capitate hairs (above) ca. 60μ in diameter and 1 mm. long; stamens 4, 5 or 6, the glabrous filaments 3 mm. long and adnate at the middle of the corolla tube opposite and slightly below the sinuses of the corolla lobes, all bearing fertile anthers ca. 3 mm. long, the anthers not coherent; cupulate annular disc conspicuous at base of ovary, ca. 1 mm. high; ovary and style ca. 8 mm. long, the ovary glabrous, the base of the style with capitate glandular hairs, the style cleft horizontally at the dilated apex into 2 applanate stigmatic lobes ca. 2 mm. long, the style separating ca. 1–2 mm. above the summit of the mature fruit; fruit a white, slightly translucent, ovoid, succulent berry with thick, fleshy pericarp and thin, intrusive placentae, up to 1.5 cm. broad and 2 cm. long, the apex rounded; seeds numerous, $2/3$ mm. long, ovoid, foveolate.

SYNTYPE. Caroline Islands, Palau, Korrer (Koror) Island, Todaiyama, 150 m. in dense, wet jungles, August 1932, *Kanehira 1854* (K).

× 2; d, same, showing interior of corolla, × 2; e, 5-stamen flower, × 2; f, same in plane view, × 2; g, same showing interior of corolla, × 2; h, young inflorescence, × 1; i, multicellular hairs of outer surface of corolla, × 20; j, multicellular colleters of inner surface of corolla, × 20; k, ovary from mature flower, × 4; l, mature fruit, × 2.

Caroline Islands. Toirechuil, Palau group. Growing in a limestone "sink" under dense canopy of shrubs and trees approximately 10 meters above the sea, *Hardy & Ootobed*, s.n. (13 specimens) (A, BISH, E, UC, US).

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